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ABSTRACT

The interaction needs and performance of distance learners in synchronous and asynchronous classes were compared in a study of 313 students enrolled in 16 distance education courses at Iowa State University in 1995 and 1996. The courses were offered through traditional face-to-face classroom instruction, over the Iowa Communications Network (ICN), and via videotape. The students completed a questionnaire consisting of 68 interaction statements that were measured on an 8-point Likert-type scale. Most learners believed that experiences aimed at interaction between learner and instructor were slightly to very positively related to their learning. They also deemed instructors' interest, teaching skills, and personal interaction with learners important to the learning process. Opportunities to discuss assignments and/or course work with instructors were viewed positively by both groups of learners. The asynchronous learners did not consider that learning individually was a hindrance to their education; however, synchronous ICN learners indicated a dislike for being the only learner at a particular learning site. When the interaction needs of learners receiving instruction by the different delivery methods were compared, no significant differences were found. Neither was there any significant difference in the two groups' grade distributions. (Contains 12 references.) (MN)

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A COMPARISON OF INTERACTION NEEDS AND PERFORMANCE OF DISTANCE LEARNERS IN SYNCHRONOUS AND ASYNCHRONOUS CLASSES

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A COMPARISON OF INTERACTION NEEDS AND PERFORMANCE OF DISTANCE LEARNERS IN SYNCHRONOUS AND ASYNCHRONOUS CLASSES*

Introduction/Theoretical Framework

Making education accessible to adult learners through the use of communication technologies and instructional systems has certainly brought a change in education, and agricultural education programs are no exception. The use of distance education in agricultural education has increased the educational opportunities for many adult learners. Agricultural educators use distance education to provide educational opportunities to adults who would not otherwise have access due to the constraints imposed by work, family, and social commitments (Schoenfelder, 1995).

Because distance education is a growing alternative to traditional classroom instruction, a learner's ability to interact with the instructor is very important (Main, 1995). Acker and McCain stated that "interaction is central to the social expectations of education in the broadest sense and is in itself a primary goal of the larger educational process and that feedback between learner and teacher is necessary for education to develop and improve" (Acker & McCain, 1993, p.11). Kearsley (1995), stated:

> One of the most important instructional elements of contemporary distance education is interaction. It is widely held that a high level of interaction is desirable and positively affects the effectiveness of any distance education course. However, it is not clear from research or evaluation data that interaction does improve the quality of learning in most distance education programs (p.366).

Interaction has been described as important to the instructional process and as one of the central issues related to distance education today (Jackson, 1994; Main, 1995). The types and quality of interaction provided in distance education courses concerns educators because learner satisfaction and perceived learning are affected by interaction (Scholdt, 1995).

Today distance education opportunities are offered through a wide variety of media (Schlosser & Anderson, 1993). These media allow instructors to deliver their courses both live and delayed through the use of video storage mechanisms. This has led to the dividing of interaction in distance education into two categories; synchronous and asynchronous. Willis defined synchronous interaction as being "real-time, live and conversation-like during the instructional setting," asynchronous as "delayed, before or after the instructional session (Willis, 1994, p.46)."

Do interaction needs vary with delivery method? Can interaction take place in a delayed setting? Is interaction related to learner performance? Research needs to be conducted by researchers in this area that will enable educators to understand the

interaction needs of learners and develop agricultural distance courses that will meet those needs.

Purpose/Objectives

The purpose of this study was to determine if perceived learner interaction needs and performance in agricultural courses taught via distance education through the Off-Campus Professional Agriculture Program at Iowa State University were different based on the delivery system of the course -- synchronous versus asynchronous. The objectives are as follows:

1. Describe selected demographic characteristics of learners enrolled in courses offered through the Off-Campus Professional Agriculture Program.
2. Determine if learner interaction needs are different in courses delivered by synchronous versus asynchronous methods.
3. Determine if learner performance is different in courses delivered by sychronous versus asynchronous methods.

Methods/Procedures

The research undertaken was descriptive in nature. The population for the study consisted of all learners enrolled in distance education courses administered through the Off-Campus Professional Agriculture Program at Iowa State University during the Spring semesters of 1995 and 1996, and the Fall Semester of 1995. A census was used to collect data.

Data were collected on 313 students from the following courses: Applied Non-Ruminant Nutrition (AnS 512), Wildlife and Agriculture (A Ecl 130), Advanced Crop Management (Agron 542), Agricultural Safety and Health (AST 436X), Principles of Crop Production (Agron 114), Agricultural and Extension Education in Developing Countries (AgEdS 561), Fundamentals of Entomology and Pest Management (Ent 376), Leadership Programs in Agriculture (AgEdS 315), Agricultural Markets (Econ 334), Biochemistry and Biophysics (BB405), Vegetable Crop Production (Hort 471), Workshop in Statistics (Stat 493), Instructional and Organizational Problems of Beginning Professionals in Agriculture (AgEdS 511), Biochemistry (BB 404), Models of Community (Soc 533), and Agricultural Meteorology (Agron 541). The courses were offered through traditional classroom format (face-to-face), over the Iowa Communications Network (ICN), and via videotape.

As a point of clarification to the reader, the ICN (Iowa Communication Network) is an end-to-end fiber optic digital transmission, error-free data transport, and sharp, crisp two-way voice communications. The network links Iowa's schools, public universities, community colleges, independent colleges, government offices and libraries. These facilities are available to Iowans through access points in each of the state's 99 counties, thus making everyone within 20 minutes of an ICN user site.

The questionnaire utilized in the study was developed by the researchers and consisted of an interaction statements section and a demographics section. Content and face validity were established by a panel of experts in agricultural education. A pilot test was conducted using past learners of distance education courses offered through the Off-Campus Professional Agriculture Program. Cronbach's alpha was used to estimate the internal consistency of the instrument. The reliability coefficient for the pilot test was .93. No changes were made to the instrument after the pilot test. The reliability coefficient was .95 for the Spring 1995 study respondents and .93 for the Fall 1995 and Spring 1996 respondents.

The 68 interaction statements were measured using a Likert-type scale which ranged from extremely negative (1) to extremely positive (8), and included a does not apply (9) response category. The statements were developed from a review of relevant literature and instruments used for similar purposes in other studies. Each statement asked the learner to read the statement and circle the number which represented the extent to which they felt the experience to be a positive or negative in relationship to their learning.

The questionnaire, along with a cover letter and a stamped return envelope, was sent to each learner. Ten days after the initial mailing a follow-up letter was sent to all non-respondents. Approximately one month after the first mailing a second complete mailing was sent to remaining non-respondents. Two hundred and twenty-one of the 313 learners completed and returned the questionnaire for a response rate of 71%.

All data were analyzed with the SPSS/PC+ computer program. Statistics used were frequencies, percents, standard deviations, ANOVA, Chi-Square, and t-tests. The alpha level was set a priori at .05.

Results/Findings

The data collected from the respondents was placed in two groups for analysis depending on the delivery method by which the learners completed their course work: synchronous or asynchronous. The synchronous group included learners enrolled in face-to-face and ICN courses. It should be noted that the learners who took classes face-to-face did so in an ICN setting; they were the learners at the origination site for the course. Learners enrolled in videotaped courses accounted for the asynchronous group.

The learners who participated in the study ranged in age from 19 to 58 years. The mean age of learners was 35.60 with a standard deviation of 9.17. Seventy-six percent (168) of the learners in the study were male.

The learners indicated that 82% (178) of them were part-time learners. The learners were asked to report their current martial status. Sixty-six percent (146) were married, 28% (62) were single, and five percent (12) were divorced.

Table 1 shows that farming was the occupation of 33 percent (57) of the asynchronous learners yet only 16% (7) of the synchronous learners were farmers. The synchronous learners were employed more often in agribusiness or agricultural education related occupations. Approximately 30% (66) of each group of learners listed "other" as their occupation due to the fact that they had more than one occupation. Generally they indicated that they farmed and earned income from some other agricultural occupation.

Table 1
Occupation of Learners Enrolled in the Off-Campus Professional Agriculture Program Based Upon Delivery Method

Occupation	Synchronous		Asynchronous	
	f	%	f	%
Farming	7	15.9	57	33.3
Agribusiness	10	22.7	44	25.7
Agricultural Extension	4	9.1	5	2.9
Agricultural Education	10	22.7	12	7.0
Other	13	29.5	53	31.0
Total	44	100.0	173	100.0

Table 2
Learners Reason for Enrolling in the Off-Campus Professional Agriculture Program Based Upon Delivery Method

Reason	Synchronous		Asynchronous	
	f	%	f	%
Pursuing a degree	26	60.5	117	70.1
To improve my business/ career performance	13	30.1	31	18.6
For personal interest/hobby	2	4.7	6	3.6
Other	2	4.7	13	7.7
Total	43	100.0	167	100.0

Table 2 shows that sixty-one percent of the synchronous and seventy percent of the asynchronous learners indicated that they enrolled in the courses to pursue a degree; however, many learners from both groups were interested in improving their business or career performance.

Table 3 reveals that seventy-five percent of the synchronous and asynchronous learners indicated that overall they were satisfied to very satisfied with their class. A Chi-Square test was used to compare the distributions by delivery method. No difference in the distributions was detected. The vast majority of learners (95%) also indicated that they would take another course taught using distance learning.

The learners were asked to read sixty-eight interaction statements and circle a number, from one to eight, that indicated the extent to which they felt the statement was either a positive or negative learning experience. If the learner felt the experience did not apply to them, they were instructed to circle the number nine which represented "does not apply."

Table 3
Learners Overall Satisfaction With Their Off-Campus Professional Agriculture Program Class Based Upon Delivery Method.

Satisfaction	Synchronous		Asynchronous	
	f	%	f	%
Very Dissatisfied	3	6.8	10	6.0
Dissatisfied	2	4.5	2	1.1
Somewhat Dissatisfied	1	2.3	10	6.0
Somewhat Satisfied	5	11.4	20	12.0
Satisfied	17	38.6	84	50.3
Very Satisfied	16	36.4	41	24.6
Total	44	100.0	167	100.0

Table 4 shows the learners responses to the 18 statements from the interaction scale. The majority of learners indicated that they felt that experiences aimed at interaction between the learner and instructor were slightly to very positively related to their learning. They also indicated that they felt instructor interest, teaching skills, and personal interaction with the learners aided the learning process. Opportunities to discuss assignments and/or course work with instructors was viewed positively by both groups of learners.

Table 4 also shows that learners taking courses asynchronously felt that self-regulation of learning was more important than did the respondents in the synchronous group. However, both groups indicated that being physically separated from the teacher did not pose a considerable challenge to learning. They also indicated that they felt personal enthusiasm for their classes was moderately to very positively related to their learning.

Table 4
Mean Scores for Selected Statements Related to Interaction by Delivery Method

Statement (in order of appearance on questionnaire)	Delivery Method	
	Synchronous	Asynchronous
Discussing class assignments with instructor during class time.	6.27	4.79
Talking informally with instructor.	6.53	6.50
Privately discussing course work with other learners.	6.29	6.12
Instructor makes eye contact with me.	6.53	6.43
Instructor treats some members of the class differently than others.	3.56	3.28
Class members talking during class (interrupting teacher).	3.62	3.32
Instructor shows personal interest in my class work.	6.55	6.54
Instructor ignores me during class.	3.00	3.03
Instructor uses a variety of audio-visual aids in class.	6.97	6.95
Poor instructor use of distance education technology.	4.18	4.47
Being physically separated from the teacher (such as being in a remote location).	4.54	5.07
Instructor provides learner(s) remarks concerning class.	6.71	6.68
Self-regulation (control) of learning.	6.36	6.51
Personal enthusiasm for class.	6.05	6.79
Instructor visiting off-campus site classes.	5.94	5.94
Help from remote-site technicians.	5.68	5.73
Scheduling time to work on class assignments.	5.91	5.94
Being the only learner at a remote site	4.43	5.16

Note: Based on Scale: 1= Extremely negative; 2 = Very negative; 3 = Moderately negative; 4 = Slightly negative; 5 = Slightly positive; 6 = Moderately positive; 7 = Very positive; 8 = Extremely positive

Scheduling time to work on class assignments was felt to be moderately positively related to learning by all the learners. The asynchronous learners indicated that they did not feel that learning individually was a hindrance to their education but synchronous ICN learners indicated a dislike for being the only learner at a particular learning site.

The effect of poor instructor use of distance education technology was felt to be slightly negative by each of the groups of learners, with the synchronous learners believing it to be most negative. The learners also felt that talking during class, being ignored by the instructor, and the instructor treating some class members differently than others was also negatively related to their learning.

After analyzing each interaction item individually a grand mean for interaction was obtained. A t-test was utilized to compare the means of the two groups. When the interaction scale was compared to the learners' interaction needs based upon delivery method no difference was found at the .05 level of significance.

Table 5 indicates that over 60 percent of asynchronous learners felt that items relating to interaction with the instructor did not apply to their learning. The asynchronous learners also did not indicate a need for as much guidance from the instructor as did their synchronous counterparts.

It was interesting to note that 42 percent of the asynchronous learners felt "using computers outside of class," did not apply to their learning experience while only 23 percent of the synchronous responded similarly. The asynchronous learners also demonstrated less of a need for involvement and support from their classmates as did the synchronous learners.

Seldom did the asynchronous learner indicate that a statement "did not apply" less frequently than did the synchronous learner. However, an example of one statement where the synchronous chose "does not apply" less often than the asynchronous learners was "program support staff."

Table 6 reveals that over half of the learners' received an "A" as their final grade for the course they took via the Off-Campus Professional Agriculture Program regardless of delivery method. An additional 20 percent (23) of the synchronous and 16 percent (26) of the asynchronous learners received a "B" as their final course grade. The asynchronous learner population also accounted for the largest percentage of learners reporting a grade of "Incomplete." Of the 29 learners receiving no grade, 83% (24) were learners who took their course via asynchronous delivery. A Chi-Square analysis was used to compare the grade distributions of the two groups. When final course grades (excluding the no grade category) were compared to the learners' interaction needs based upon delivery method no difference in the grade distributions was found.

Table 5
Interaction Statements Selected by Students' As Not Applying To Their Learning By Delivery Method

Statement (in order of appearance on questionnaire)	Percent Choosing "Does Not Apply" Synchronous	Asynchronous
Discussing class assignments with other students during class time.	2.3	62.2
Instructor makes eye contact with me.	22.7	64.5
Using computers outside of class	22.7	42.4
Having personal active involvement in the class.	6.8	49.4
Instructor provides students' guidance regarding class assignments.	4.5	23.4
Classmates enthusiasm for class.	4.5	41.9
Program support staff.	20.5	6.4
Peer evaluation of my class work.	38.6	62.0

Note: Based on Scale: 1= Extremely negative; 2 = Very negative; 3 = Moderately negative; 4 = Slightly negative; 5 = Slightly positive; 6 = Moderately positive; 7 = Very positive; 8 = Extremely positive

Table 6
Final Course Grades of Students Enrolled in the Off-Campus Professional Agriculture Program Based Upon Delivery Method

Grade	Synchronous f	%	Asynchronous f	%
"A"	23	56.1	97	59.1
"B'	8	19.5	26	15.9
"C"	4	9.8	15	9.1
"D"	1	2.4	1	.6
"F"	0	0.0	1	.6
"Incomplete"	5	12.2	24	14.6
Total	41	100.0	164	100.0

Conclusions/Recommendations/Implications

Educators of agricultural distance education courses should be aware of the differences in interaction needs of their learners. The results of this study indicate that the

interaction needs of synchronous and asynchronous learners, while similar in general, vary on individual items based upon the delivery method used for the course.

Regardless of delivery method, the learners' enrolled in these classes were overall satisfied to very satisfied. Studies such as this one are valuable in documenting the desirability of distance learning. Biner, et. al, (1994) concluded that high learner satisfaction could benefit distance education by promoting distance education programs, motivating learners, increasing enrollment, improving learning, and decreasing attrition rates.

The data from this study suggest that instructors need personal contact with all learners regardless of delivery method. Instructors should use this personal contact to clarify course assignments and expectations. A study by Rodriguez (1995), found that learners and professors believed that such interaction enhanced communications, improved teaching and learner interest in content matter. The respondents also indicated a slight desire for interaction between learners regardless of delivery method. Teachers educators should be aware of this desire and plan activities which incorporate interpersonal interaction into their courses.

It was interesting to note that learners taking courses asynchronously did not perceive interaction to be as important to their learning as did learners taking courses synchronously. However, when the asynchronous learners expressed a need for interaction, their responses were similar to the synchronous learners. Adult distance education learners have been described as learners possessing strong motivation, study skills, and discipline (Schoenfelder, 1995). Perhaps those learners who possess these traits do not require as much interaction as learners without these traits. Although the asynchronous learners indicated a desire for more control over their learning than synchronous learners the researchers question whether or not these individuals might learn better if interaction was improved.

Additionally, might the lack of interaction in many distance education courses be part of the reason behind the high attrition rate commonly found in distance education? In this study 10% of the learners received no grade. Could this be attributed to a lack of interaction within their selected course. Also of concern is the fact that of the learners receiving no grade, 83% took their course asynchronously. Although the asynchronous learners indicated that they did not feel that interaction was as important to their learning as the synchronous learners, could a lack of interaction account for some of these learners not completing their course on time. It is interesting to note, that course grades regardless of method, but completion rates are different.

As distance learning becomes more common in education, interaction will become a more pedagogically important issue. Further research needs to be conducted with these populations to determine how differences in interaction needs, based upon delivery method, should be addressed by agricultural distance educators.

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